REMARKS

Applicants have amended claims 8 and 12 to more appropriately define the present invention and added new claims 20 and 21 to protect additional aspects related to the present invention. Claims 8-21 remain pending, with claims 16-19 withdrawn from consideration as drawn to a nonelected invention, and claims 8-15, 20, and 21 under current examination.

Regarding the Office Action:

In the Office Action, the Examiner rejected claims 8-15 under 35 U.S.C. § 103(a) as unpatentable over Applicants' admitted prior art ("AAPA") in combination with Hisamune (U.S. Patent No. 6,415,352 B1) ("Hisamune") and Aminzadeh, et al. (U.S. Patent No. 6,707,120 B1) ("Aminzadeh"). Applicants respectfully traverse the rejection for the following reasons.[1]

Regarding the Amendments to Claims 8 and 12 and New Claims 20 and 21:

Support for the amendments to claims 8 and 12 may be found in the specification at, for example, page 12, lines 5-6 and page 29, lines 20-21. Support for new claims 20 and 21 may be found in the specification at, for example, page 24, lines 5-7 and page 30, lines 12-14.

Regarding the Rejection of Claims 8-15 under 35 U.S.C. § 103(a):

Applicants respectfully traverse the rejection of claims 8-15 under 35 U.S.C. § 103(a) as being unpatentable over AAPA in combination with Hisamune and Aminzadeh. Applicants disagree with the Examiner's arguments and conclusions. A *prima facie* case of obviousness has not been established.

> "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary

[1] The Office Action contains statements characterizing the related art, case law, and the claims. Regardless of whether any such statements are specifically identified herein, Applicants decline to automatically subscribe to any statements in the Office Action.

> skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)." M.P.E.P. § 2142, 8th Ed., Rev. 2 (May 2004), p. 2100-128.

A *prima facie* case of obviousness has not been established because, among other things, AAPA in combination with Hisamune and Aminzadeh, does not teach or suggest each and every element of Applicants' claims.

First, independent claims 8 and 12 each recite

> forming an insulating film containing silicon and nitrogen on a semiconductor substrate [and causing] the portion of the insulating film to be exposed to the outside by applying a thermal oxidation process to a semiconductor structure obtained owing to the steps of an oxidation process, the thermal oxidation process using an oxidizing gas containing one of ozone and oxygen radicals, the oxygen radicals being generated by remote plasma oxidizing method or by reacting a first gas containing oxygen and a second gas containing hydrogen.

In contrast, Hisamune teaches "an oxide/nitride/oxide sandwich structure, which serves as an electrically insulating layer." Hisamune, col. 4, lines 38-40. This sandwich structure suppresses "bird's beak" formation, and Hisamune teaches that "the nitride layer [in the sandwich structure] has an oxidation proof property that is effective in preventing oxygen radical[s] from reaching a floating gate 201 and a transfer gate." Hisamune, col. 4, lines 63-67. Therefore, Hisamune does not teach or suggest at least Applicants' claimed "thermal oxidation process" on "an insulating film containing silicon and nitrogen."

Second, Applicants' claims 8 and 12 recite a "thermal oxidation process using an oxidizing gas containing one of ozone and oxygen radicals, the oxygen radicals being generated by remote plasma oxidizing method or by reacting a first gas containing oxygen and a second gas

containing hydrogen." In contrast, Hisamune teaches using oxygen radicals generated in a furnace. *See* Hisamune, col. 2, lines 64-67. Therefore, Hisamune does not teach or suggest the above quoted elements of claims 8 and 12.

Third, for the reasons presented above, Hisamune actually teaches away from the claimed invention. The object of Hisamune is to prevent bird's beak. *See* col. 1, lines 9-10 and col. 3, lines 24-28. Thus, with Hisamune, the oxidation rate of an insulating film is low. This is very different from the above-quoted features of Applicants' claims, including the claimed "thermal oxidation process."

Fourth, on pages 3-4 of the Office Action, the Examiner alleged that AAPA teaches bird's beak oxidation owing to post oxidation, and Hisamune is also concerned about the gate bird's beak. Therefore, the Examiner alleges that employing oxidizing gas containing one of ozone and oxygen radicals of Hisamune to the oxidation process of AAPA would have been obvious to one of ordinary skill in the art. Applicants disagree with the Examiner's allegations.

In contrast to Hisamune, Applicants' specification teaches a process

> arranged to perform the post oxidization in the atmosphere containing ozone. Therefore, nitrogen adjacent to the lower edge of the gate electrode 3 and in the silicon oxinitride film 2 in the region from which the gate electrode has been removed is dissociated. Thus, the bird's beak is formed considerably owing to the proceeding of the oxidization of the silicon substrate 1. ... As a result, insulation resistance of the device can be improved. *See* page 25, lines 5-20.

In contrast to the invention recited in claims 8 and 12, Hisamune teaches

> "[i]n the oxidation process, oxygen radical ... reaches the floating gate of each memory cell, the transfer gate of each memory cell and the gate of each peripheral transistor, thereby oxidizing the silicon substrate and the material of the gates. This encroachment of the oxide ... is known as a 'gate bird's beak'... . This bird's beak causes the amount of ON-current of each memory cell or each peripheral transistor to drop appreciably. ..." *See* Hisamune, col. 2, line 64, to col. 3, line 29.

In short, claims 8 and 12 recite "a thermal oxidation process" of an insulating film by "one of ozone and oxygen radicals," *where the bird's beak is preferable for preventing dielectric failure*, while Hisamune teaches thermal oxidation in order to deposit the oxide layer over the substrate, *where the bird's beak caused by created oxygen radical is unfavorable* for scaling down of memory cell. Therefore, Hisamune teaches away from the claimed invention.

Fifth, to the extent the Examiner contends that features of claims 8 and 21 are inherently disclosed by Aminzadeh, Applicants point out the following provisions of M.P.E.P. § 2112:

> [t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic..."To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" (internal citations omitted).

Applicants also point out that:

> [i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. M.P.E.P. § 2112 (8th ed. 2001) (internal citations omitted).

The Examiner fails to provide sufficient evidence from Aminzadeh, or any recourse to extrinsic evidence, that makes clear that the subject matter of claims 8 and 12 is necessarily present in the reference. Further, the Examiner fails to present sufficient factual basis and technical reasoning to demonstrate inherency. The Examiner merely provides conclusory statements lacking evidentiary support. *See* Office Action, pp. 4-5 ("...is inherent as recognized by Aminzadeh et al."). Consequently, the Examiner cannot properly infer that the subject matter of claims 8 and 12 is inherently disclosed by Aminzadeh by a mere paraphrase of Applicants'

claim language and a conclusory statement that it "...is inherent as recognized by Aminzadeh et al."

Finally, since Aminzadeh does not teach the claimed "insulating film containing silicon and nitrogen on a semiconductor substrate" or the claimed "thermal oxidation process" of the claimed invention (claims 8 and 12), it is unreasonable for the Examiner to make a blanket generalization concluding that the claimed feature of "lowering a surface...oxygen radicals" is inherent.

For the reasons argued above, AAPA, Hisamune, and Aminzadeh, taken alone or in combination, therefore fail to teach or suggest each and every feature of independent claims 8 and 12. The Examiner has not established a *prima facie* case of obviousness.

Finally, "[i]f an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious." M.P.E.P. § 2143.03. Dependent claims 9-11 and 13-15 are also allowable for the reasons presented herein, and at least by virtue of their respective dependence from allowable base claims 8 and 12. Therefore, the improper 35 U.S.C. § 103(a) rejection of claims 8-15 should be withdrawn.

Conclusion:

In view of the foregoing, Applicants request reconsideration of the application and withdrawal of the objection and rejection. Pending claims 8-15, 20, and 21 are in condition for allowance, and Applicants request a favorable action.

Should the Examiner continue to dispute the patentability of the claims after consideration of this Amendment, Applicants encourage the Examiner to contact the undersigned representative by telephone to discuss any remaining issues or to resolve any misunderstandings.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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